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TOBACCO SMOKING, COFFEE, COCOA AND TEA CONSUMPTION IN RELATION TO MORTALITY FROM URINARY BLADDER CANCER IN ITALY

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This paper examines changes in mortality from urinary bladder cancer in Italy during the years 1950-81 in relation to changes in smoking habits and in coffee, cocoa and tea consumption. The authors found that, in both sexes and for all ages, mortality has been increasing throughout this period, although the rates and relative increase have consistently been much lower and more gradual for women than for men.

From the analysis of age-cohort-period variation it seems that bladder cancer mortality can also be influenced by changes in smoking habit patterns and by variation in the quality of diagnoses. The increase in death risk for both sexes in Italy up to cohorts born around 1905-10 can be related to occupational exposures and to high-tar-content tobacco smoking, whereas the tendency for mortality rates to stabilize and decline in cohorts born after 1910 were influenced by changes from high-tar-content and no-filter cigarettes to low-tar-content and filter cigarettes and by prevention measures taken in at-risk working environments.

The consumption of coffee, cocoa and tea does not seem to be related to the increase in bladder cancer risk in Italy.

INTRODUCTION

Many risk factors have been associated with bladder cancer. Epidemiological studies, however, have generally concentrated on determining the roles of various types of occupational exposure, tobacco smoking, and consumption of coffee, cocoa, tea, soft drinks and artificial sweeteners (3, 13, 17, 27, 34).The numerous occupational factors, that have been implicated in occurence of bladder cancer have, unfortunately, been identified in case-control studies involving small numbers of exposed subjects, and estimation of the attributable risk for the total population is, thus, subject to considerable variability (41, 45).

It has also been found that tobacco smoking, regardless of the sex or age of the subject, has a direct relationship with the incidence of bladder cancer mortality (4, 6, 8, 17, 21, 28-30). Coffee, cocoa and tea consumption have been considered as possible risk factors for bladder cancer, but definitive results are not yet available (4, 5, 13, 17, 19, 20, 27, 31-33). The associations between this form of cancer and other life-style factors, such as saccharin or alcohol consumption, have also been studied, but so far, conclusive proof is lacking (4, 16, 17, 37).

In this paper an attempt is made to interpret mortality trends for bladder cancer in Italy (1950-81) in light of patterns of cigarette smoking and coffee, cocoa and tea intake. To obtain more reliable information on bladder cancer mortality, analyses of variations in birth cohorts, age and period at death,

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using the indirect standardization method (11, 23) were done.

MATERIALS AND METHODS

The main source of data for this study it that published by the National Institute of Statistics (ISTAT) in Rome. Data on bladder cancer deaths between 1950 and 1981 from official ISTAT publications are reported according to the Ninth Revision of the International Classification of Diseases (I.C.D.: Malignant neoplasm of bladder, 188) (44). Until 1956, malignant neoplasms of other and unspecified urinary organs, with the exception of the kidney, were included in this category. In the following years, however, these neoplasms never represented more than 5% of bladder cancers.

The population figures are based on census reports from 1951, 1961, 1971 and 1981. For non-census years, populations were estimated from registry variations contained in official publications or supplied directly by ISTAT.

The mortality rates per 100,000 inhabitants – computed for all ages and for the age group 0-64 years – were calculated on a five-yearly basis, and age-adjusted by a direct method, using the world population model as standard (43). Analyses of variation in birth cohort, age and period at death were done by the indirect standardization method (11, 23). This method is an indirect age-standardization using period of death and birth cohort and calculating a standardized period mortality ratio and a standardized cohort mortality ratio. The first ratio measures the variation between periods, the second the variation between birth cohorts, although the two ratios ignore the potential period effect and the potential cohort effect respectively. Details of this method are reported in previous papers (22, 23).

The data on tobacco consumption (1901-81) was obtained from official publications of the Administration of State Monopolies or from unpublished material kindly provided by the same Administration. The data on coffee (1901-81), cocoa and tea intake (1951-81) are from official ISTAT publications.

RESULTS

Tables 1 and 2 show bladder cancer mortality in Italy during the 1950-81 period. For men, both the crude and adjusted rates rise steadily until 1981. The increases in the three rates (crude, all-age-adjusted – all AADR – and adjusted for 0-64 yrs (0-64 AADR) are respectively 256, 154, and 73 per cent. In females, the rates are lower, but, with the exception of the 0-64 AADR, show generally increasing trends. The rates relative to the youngest age-groups are low and almost constant.

In males the cohort variation rises till 1905, then begins to level off. The period variation rises sharply over the studied years, and there is a steady increase in the age variation (Fig. 1).

In females both cohort and period variation follow the male trends though less markedly, whereas in age variation the increase is more evident (Fig. 1).

Table 3 shows te consumption of coffee, total tobacco, cigarettes and the percentages of filtered cigarettes from 1901 to 1981 and of cocoa and tea from 1951 to 1981. The consumption of total tobacco rose drammatically until 1981, as did the number of cigarettes smoked. In the same period, a clear modification in the type of cigarettes smoked is noted. In 1951 the percentage of filtered cigarettes was close to zero, while in 1981 it was over 90%. Cocoa consumption rose from 1951 up to 1966 and after that decreased slightly. Coffee consumption has markedly increased from about 500g pro capita in 1901 to over 5000 in 1981. Tea intake shows a five-fold increase over the last 30 years.

TABLE 1. – Bladder cancer in Italy. Age specific death rates per 100,000 inhabitants, crude and age-adjusted rates (AADR) for 0-64 and all ages from 1950 to 1981. Males.

Age in years	YEARS						
	1950-54	1955-59	1960-64	1965-69	1970-74	1975-79	1980-81
45-49	2.76	2.89	2.45	2.72	3.05	3.17	3.24
50-54	5.72	6.73	7.07	6.21	6.58	8.47	7.84
55-59	9.43	12.91	13.52	14.71	14.39	16.26	16.77
60-64	13.04	20.33	24.24	27.08	27.04	28.73	30.40
65-69	18.76	24.47	33.41	42.75	45.93	50.46	52.12
70-74	25.36	33.04	42.21	53.31	63.58	74.48	79.84
75-79	36.40	45.86	47.21	62.63	82.58	104.44	115.00
80-84	38.39	54.45	61.96	70.67	86.53	121.77	148.59
Crude rate	3.47	4.80	5.96	7.25	8.86	11.03	12.37
All AADR	3.27	4.34	5.11	5.94	6.65	7.76	8.29
0-64 AADR	1.58	2.10	2.29	2.42	2.46	2.73	2.74

TABLE 2. – Bladder cancer in Italy. Age specific death rates per 100,000 inhabitants, crude and age-adjusted rates (AADR) for 0-64 and all ages from 1950 to 1981. Females.

Age in years	YEARS						
	1950-54	1955-59	1960-64	1965-69	1970-74	1975-79	1980-81
45-49	0.67	0.70	0.44	0.59	0.57	0.54	2.64
50-54	1.26	1.37	1.12	1.30	0.91	1.13	3.66
55-59	2.09	2.46	2.28	2.26	2.07	2.20	6.94
60-64	3.91	4.39	4.37	3.88	3.92	4.28	12.42
65-69	5.94	6.85	5.97	6.41	7.21	7.92	19.09
70-74	8.57	9.41	10.56	10.66	10.87	12.58	30.10
75-79	9.69	14.98	14.62	16.03	17.34	17.65	41.53
80-84	11.75	18.66	22.28	21.86	23.87	29.73	41.18
Crude rate	1.14	1.56	1.70	1.89	2.18	2.65	2.90
All AADR	0.93	1.17	1.14	1.18	1.22	1.36	1.37
0-64 AADR	0.41	0.47	0.42	0.41	0.38	0.40	0.39

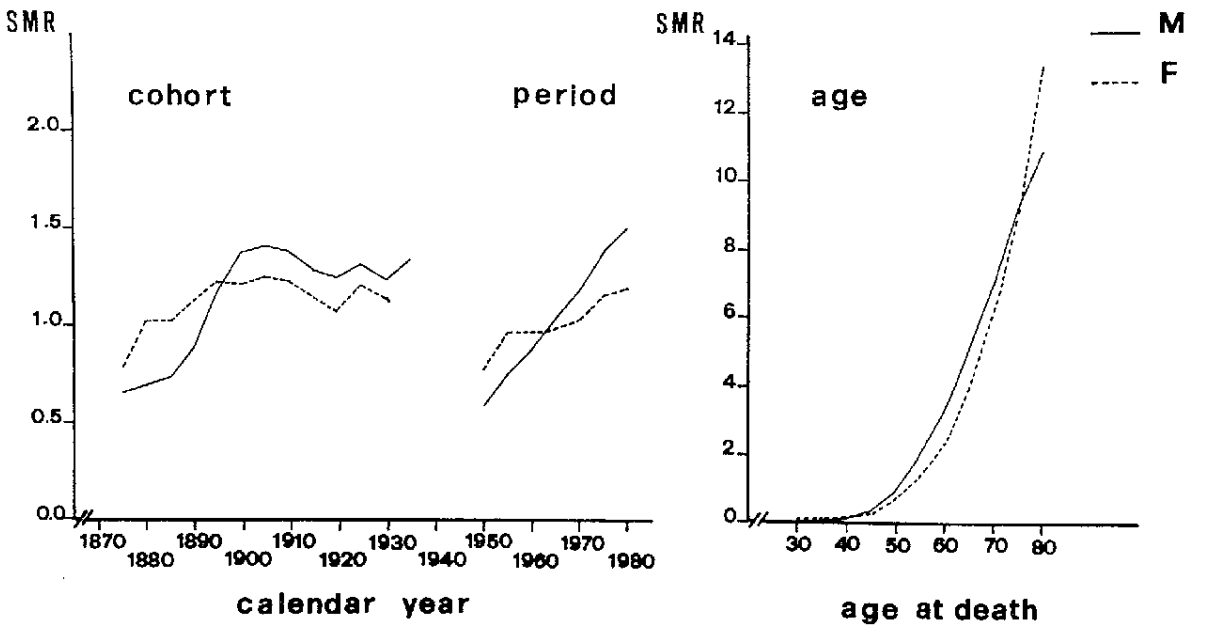

Figure 1. - Bladder cancer mortality in Italy. Standardized Mortality Ratio (SMR) relative to cohort, period and age variation.

TABLE 3. – Yearly consumption in Italy by persons over 14 years of total tobacco, cigarettes, percent of filter tipped cigs, total coffee, cocoa and tea.

Years	grams of					
	total tobacco	cigarettes	% filter-tipped cigs	coffee	cocoa	tea
1901	732	37	0.0	500	....	....
1911	805	115	0.0	800	....	....
1921	1043	415	0.0	1300	....	....
1931	875	452	0.0	1100	....	....
1941	1050	714	0.0	....	....	....
1951	1106	870	0.4	1524	357	37
1956	1310	1103	1.4	2066	618	95
1961	1536	1428	20.4	2752	955	114
1966	1767	1637	48.6	3132	1057	137
1971	1861	1766	66.1	4329	1031	161
1976	2168	2106	85.1	4973	831	240
1981	2274	2228	90.4	5037	785	174

DISCUSSION

The results of this investigation show that in Italy, over the last thirty years, the standardized mortality rates from urinary bladder cancer in men of all ages have gradually increased. For women the rise in mortality rates has always been lower and more gradual. The above described time trends for bladder cancer mortality in Italy during the period studied could be related to the variations in both the period and cohort effects. In fact the period effect increases over the thirty years under study, and the cohort effect shows an increase up to the cohort born around 1905-10 and then begins to level off. Similar results, in the trend of period and cohort effect in Italy, are reported by other authors who have calculated the effect of age-period-cohort by statistical model (7, 12).

The evident increase in period effect variation could also reflect the a fact that, in recent decades, diagnosis of cause of death, especially in older subjects, has improved considerably (2). This could also have influenced the better diagnosis of death from bladder cancers, considering that these tumors are diagnosed in persons in their sixties or seventies (27). Nevertheless our mortality data cannot take into account the improved therapeutics and the increase in survival, because the data on incidence are unavailable.

The trend in cohort effect variation might be related to smoking habits and/or certain types of occupational exposure. The progressive increase in bladder cancer mortality at all ages for men born before 1905 might reflect the high tar content of tobacco used in the past (24, 26). In fact data on tobacco products consumed during the 19th century show that since 1867, 48% of tobacco consumption was shag, 28% cigars and 24% snuff and during the

period 1894-95 the percentage of handrolled cigarettes was 12% (1). Moreover the above observed trends could also be influenced by lack of primary prevention measures highest occupational exposures as well as aromatic amines, mostly in dye industries and rubber plants (12).

The tendency toward stabilization and decline of mortality rates in generations born after 1905-10 may be explained in terms of changes in smoking habits and improved occupational safety. In fact, since then, there has been a progressive change from high-tar, non-filter cigarettes to lower-tar-content, filter cigarettes. Just after the Second World War, in particular after 1950, the first filter tipped cigarettes with low-tar-content came into use (7, 24, 26).

It is probable that better protection in work places has also helped to reduce bladder cancer incidence, and thus mortality during recent years. For our study, the attributable risk of occupational exposures is very difficult to evaluate, considering that the number of Italian workers exposed, in the last decades as well, is practically unknown. Vineis et al. (41) estimated that the attributable risk varies from 0 to 19%, other authors evaluated this proportion from 10 to 35% (6, 8, 30). It then would be hard to quantify the reduction on mortality trend derived from protection of workers.

The smaller and more recent increase in bladder cancer mortality for Italian women could be attributed to the fact that cigarette smoking habits among Italian females have changed since the beginning of this century or to the fact that more women are now employed in industrial activities. The proportion of female smokers in Italy in 1980 was 16.7%, and that of male smokers was 54.3% (18), whereas in 1957 only 6% of women smoked compared to 55% of men (9). It is very likely that in the previous decades, female smokers were even less common. It can also be assumed that, in Italy, women have always used cigarettes with a low-tar-content and more filter cigarettes than men. The percentage of female smokers who used filter cigarettes in 1957 was 15 and in 1965, 80 as opposed to only 6 and 49% of males (9, 10, 12).

Similar observations on the decreasing carcinogenicity of cigarettes have been made by several other investigators of mortality from lung cancer, which is even more strongly linked to tobacco smoking than is bladder cancer (14, 25, 26, 36, 42). In fact, in both males and females of the more recent cohorts mortality from lung cancer seems to be decreasing in Italy as well, probably because of the diminishing tar content and the increasing use of filter-tipped cigarettes (26). If, as it seems, the attributable risk of tobacco smoking for bladder cancer in males is close to 60% (8), a considerable variation of the weight of this factor might have influenced the mortality trend.

Our interpretation of cohort-variation trends for urinary bladder cancer in Italy is in agreement with data reported for other countries (6, 8, 15, 17, 40). Moolgavkar and Stevens (30), for example, examining the mortality data from carcinomas of the bladder in England and Wales, emphasized that the differences found between male and female rates were attributable to differences in smoking habits. In their opinion the increasing trend in bladder cancer mortality was almost entirely due to a mortality increase in smokers. In fact mortality in non-smokers fell from 1941 to 1975. Several epidemiologic studies also report that the recent shift in mortality trends from cancer of all sites in relation to cigarette smoking may be explained in terms of changes in the type of cigarettes smoked by later generations (8, 26). Very recent studies all confirm a consistent and significant dose-response relation between bladder cancer incidence and cigarette consumption, and a significant decrease in risk was also shown for ex-smokers (4, 21, 35).

As far as other risk factors are concerned, our data shows no clear connection between coffee, cocoa and tea intake and cohort variation trends. However most investigators have reached different conclusions (13, 19, 33, 38).

Matanoski and Elliot (27) state that "in general, the studies find no signs of increasing risks of bladder cancer with increasing doses of coffee" and "it is probable that coffee is not a direct cause of bladder cancer, but may be indirecty associated through another factor", for example, smoking, which could camouflage the effect of coffee. Contradictory results have been found for cocoa and tea consumption, thought to be associated with bladder cancer (20,39).

In conclusion this study does not seem to exclude the possible link between cigarette smoking and urinary bladder cancer or the positive influence of low-tar, filter cigarette use by a large number of smokers. The roles of coffee, cocoa, and tea consumption are more difficult to interpret, though our results seem to be consistent with those of other authors (13, 19, 20).

We believe that further studies which attempt to find and evaluate possible relations between urinary bladder cancer and dietary risk factors, using either the factors examined above or those not yet studied by us because of a lack of reliable official data, are necessary.

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